

# EILAR ASSOCIATES

## ACOUSTICAL and ENVIRONMENTAL CONSULTING

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September 11, 2006

County of San Diego  
c/o Nextel Communications, Inc.  
Attention: Jim Kennedy  
5761 Copley Drive, Suite 100  
San Diego, California 92111

Job # A60126N2

**SUBJECT: RESPONSE TO FIRST ITERATION REVIEW OF CINGULAR WIRELESS FACILITY ZAP 05-016  
SYCAMORE CANYON**

This letter is in response to your letter concerning the second iteration review of the above-referenced project. The changes in the report are provided in ~~strikeout~~/underline format. This letter will reference the location of each response to the comment(s) or requested change(s) indicated on your letter.

*Italics are added to indicate County of San Diego Staff comments.*

### **Noise Impact Analysis:**

*Staff has completed the review of the site plans and your Noise Impact Analysis by Eilar Associates (#A60126N1) submitted May 8, 2006, for the proposed Nextel wireless facilities in the community of Jamul. Staff has evaluated the results as an independent check of the findings from the proprietary CADNA program. The resulting sound levels along the northern and the western property lines would exceed 45 decibels (A) without the implementation of a 6-foot tall sound attenuation barrier around the north side of the equipment shelter next to the wall-mounted air conditioners (Two Marvair Compac II units). Staff will require an exhibit of the barrier design and minor documentation of the project features before final recommendations can be made. With materials included, staff may be able to expedite the next submittal if arrangements with the project lead are made beforehand. Staff has the following comments about the Noise Impact Analysis:*

1. *In Section 2.1, please state the zoning designation of the project site and the adjacent properties is A-72. Although this area is residential, this information needs to be clarified to identify the applicable (zonal) limits from Section 36.404.*

Response: Section 2.1 has been revised to include the zoning designations.

2. *In Section 4.1.3, please include the Allen residence in Table 3 as one of the noise receptors for the project. A CADNA estimate would be optional if the results of the distance calculations are determined to be less than significant.*

Response: An additional receptor at the on-site residence has been included in the analysis

3. *In Section 4.1.3, please explain or identify the site conditions that lead to the large discrepancy (more than 5 decibels) at the eastern property line between the calculated and the CADNA results.*

Response: In Section 4.1.3 the difference between the manually calculated and CADNA values have been explained.

4. *In Section 6, please briefly describe the barrier-shelter "noise" seal at the northwest corner of the proposed equipment shelter as part of the material design of the project.*

Response: A description of the seal between the sound barrier and the equipment shelter has been described.

5. *Please provide a separate scaled exhibit or figure showing the location, length, and required top of barrier elevation for the proposed 6-foot tall sound attenuation barrier (mitigation measure) for this project. There appears to be a discrepancy between the "Enlarged Site Plan" in Appendix A and the one found in the recently submitted site plans (Sheet A-401). Please demonstrate the feasibility of the mitigation and the future access to this equipment.*

Response: An additional exhibit of the sound attenuation detail has been provided as Figure 8.

Please call if you have any questions or require additional information.

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Justin Smith, Senior Acoustical Consultant



## **NOISE IMPACT ANALYSIS**

**Nextel Communications  
Site Number: CA-8412  
Site Name: Sycamore Canyon  
1853 Honey Springs Road  
Jamul, California 91935**

**County of San Diego Limited Use Permit  
Case Number: P05-016**

### **Prepared For**

**Nextel Communications, Inc.  
Attention: Jim Kennedy  
5761 Copley Drive, Suite 100  
San Diego, California 92111  
Phone 858-650-4265  
Fax 858-650-4202**

### **Property Owner**

**Stephen Allen  
2744 55<sup>th</sup> Street  
San Diego, California 92105**

### **Prepared By**

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**Job # A60126N2**

**September 11, 2006**

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## APPENDICES

- A. Site Plans for Nextel Wireless Telecommunications Facility
- B. Pertinent Sections of the County of San Diego Scoping Letter, Dated July 12, 2005
- C. San Diego County Code, Section 36.404, Sound Level Limits
- D. Cadna Analysis Data and Results

## 1.0 EXECUTIVE SUMMARY

The proposed Nextel wireless telecommunications facility, known as Sycamore Canyon, consists of the construction of an unmanned telecommunications facility consisting of a 13-foot high by 11.5-foot wide by 20-foot long prefabricated equipment shelter which will enclose equipment cabinets for wireless telecommunications equipment. Also planned are three omni-directional antennas which will be mounted on a proposed 35-foot high mono-broadleaf and two GPS antennas which will be mounted on the equipment shelter. New electric and telco runs to the area of the equipment shelter are also planned. The project site is located at 1853 Honey Springs Road, in Jamul, County of San Diego, California.

The purpose of this report is to assess noise impacts from on-site noise sources, and to determine if mitigation is necessary and feasible to reduce project related property line noise impacts to below 45 dBA, in compliance with the County of San Diego most restrictive nighttime property line noise limit.

Based on the project information available, calculations show that HVAC equipment noise impacts from the proposed Nextel facility will be as high as 49.0 dBA  $L_{EQ}$  at the western property line, at the worst case location.

Mitigation is required to reduce the property line noise impacts to meet the most restrictive 45 dBA nighttime noise limit at the western and northern property lines. The noise levels at the remaining property lines are expected to comply with the County of San Diego nighttime property line noise limits without any mitigation measures, due to distance and topography.

The required noise levels can be achieved by shielding the air conditioning units with a sound attenuation barrier. The barrier should be constructed to a height of 6-feet relative to the equipment shelter pad grade elevation. The barrier should extend from the northwest corner of the proposed equipment shelter heading northwest a distance of five feet, with a return heading northeast a distance of 11.5 feet. No other noise attenuation mitigation for the proposed project is required.

With the recommended mitigation, the unmanned operation of this facility will be in compliance with the most restrictive County of San Diego 45 dBA nighttime property line noise limits.

## 2.0 INTRODUCTION

This acoustical analysis report is submitted to satisfy the County of San Diego requirement for a limited use permit. Its purpose is to assess noise impacts from on-site project related noise sources, and to determine if mitigation is necessary and feasible to reduce property line noise impacts to below 45 dBA, in compliance with the County of San Diego nighttime property line noise limit.

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting, abbreviated "dBA," to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol " $L_{EQ}$ " unless a different time period is specified; " $L_{EQ}$ " is implied to mean a period of one hour. Some of the data may also be presented as octave-band-filtered and/or A-octave-band-filtered data, which are a series of sound spectra centered about each stated frequency, with half of the bandwidth above and half of the bandwidth below each stated frequency. This data is typically used for machinery noise analysis and barrier-effectiveness calculations.

The Community Noise Equivalent Level (CNEL) is a 24-hour average, where sound levels during evening hours of 7 p.m. to 10 p.m. have an added 5 dB weighting, and sound levels during nighttime hours of 10 p.m. to 7 a.m. have an added 10 dB weighting. This is similar to the Day-Night Sound Level ( $L_{DN}$ ), which is a 24-hour average with 10 dB added weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on A-weighted decibels. These data unit metrics are used to express noise levels for both measurement and municipal noise ordinances and regulations, for land use guidelines, and enforcement of noise ordinances. Further explanation can be provided upon request.

Noise emission data is often supplied per the industry standard format of Sound Power, which is the total acoustic power radiated from a given sound source as related to a reference power level. Sound Power differs from Sound Pressure, which is the fluctuations in air pressure caused by the presence of sound waves, and is generally the format that describes noise levels as heard by the receiver.

Sound Pressure is the actual noise experienced by a human or registered by a sound level instrument. When Sound Pressure is used to describe a noise source it must specify the distance from the noise source to provide complete information. Sound Power, on the other hand, is a specialized analytical method to provide information without the distance requirement, but it may be used to calculate the sound pressure at any desired distance.

## **2.1 Project Location**

The subject property is located at 1853 Honey Springs Road, in Jamul Valley, California. The Assessor's Parcel Number (APN) is 600-220-18-00. The overall property is irregular in shape with an overall site area of approximately 8.7 acres. The zoning designation for the subject parcel and surrounding properties is A-72 for agricultural use.

The subject property is currently occupied by a single private residence. There are no existing wireless facilities on the subject site. The lease area site is in the northern central vicinity of the subject property at the top of a slope, approximately 140 feet north of the existing home. The lease area is currently an undeveloped open space.

For a graphic representation of the site, please refer to the Thomas Guide Map, Assessor's Parcel Map, Satellite Aerial Photograph, Topographic Map, and Land Use Map provided as Figures 1 through 5, respectively.

## **2.2 Project Description**

The proposed project consists of the construction of an unmanned telecommunications facility consisting of a 13-foot high by 11.5-foot wide by 20-foot long prefabricated equipment shelter which will enclose equipment cabinets for wireless telecommunications equipment. Also planned are three omnidirectional antennas which will be mounted on a proposed 35-foot high mono-broadleaf and two GPS antennas which will be mounted on the equipment shelter. New electric and telco runs to the area of the equipment shelter are also planned.

For additional project details, please refer to the project plans provided in Appendix A.

## **2.3 Applicable Noise Standards**

The noise regulations applicable to this project are contained within the San Diego County Code, Section 8.32.040, entitled Sound Level Limits. Based on these noise regulations, and the County of San Diego scoping letter, dated July 12, 2005, the following property line noise limits apply for this project: 50 dBA from 7 a.m. to 10 p.m. and 45 dBA from 10 p.m. to 7 a.m. Planning for this project will be based on the more restrictive nighttime limit of 45 dBA.

Please refer to copies of the pertinent related sections from the County of San Diego scoping letter which is provided as Appendix B and pertinent sections of the San Diego County Code provided as Appendix C.

## **3.0 ENVIRONMENTAL SETTING**

### **3.1 Existing Noise Environment**

The existing noise environment is primarily a result of wind, and occasional small aircraft over-flight.

#### **3.1.2 Ambient Noise Monitoring**

An on-site inspection was conducted at 1:25 p.m. on Monday, February 13, 2006. The weather conditions were as follows: winds of 5-10 mph from the north, low humidity, and temperatures in the low 80's. A 5-minute ambient noise measurement of 60.9 dBA  $L_{EQ}$  was taken at a location within the proposed lease area. The microphone position was approximately five feet above the existing grade.

### **3.1 Future Noise Environment**

The future noise environment in the vicinity of the project site will be primarily a result of the same noise sources, as well as the proposed Nextel wireless facility.

#### **3.2.1 Project Related Noise Sources**

The proposed Nextel wireless equipment facility consists of one type of significant noise source, which are exterior-mounted air conditioning units.

Information regarding the specific air conditioning unit type to be used for this project was not available for review by Eilar Associates. However, a typical unit used in this type of installation, which represents an appropriate worst-case model, is the Marvair ComPac II HVAC unit. While two HVAC units are typically installed on the exterior of an equipment shelter, only one is expected to be operational at a time, never running simultaneously. The proposed Nextel facility is planned to be operational 24 hours a day, 7 days a week.

To determine the expected equipment exterior noise levels for this analysis, it was necessary to measure the noise level of a single operational unit. The manufacturer's data show the noise emission level for this unit as 73 dBA at 5 feet. A noise level measurement of a single existing Marvair ComPac II HVAC unit was made at an operational Verizon installation at Casa de las Campanas, 18655 West Bernardo Drive, in the City of San Diego, California, at 7:30 a.m. on November 24, 2003. The measured noise level was 74.9 dBA  $L_{EQ}$  at 5 feet. The measurement may have a small traffic noise contribution,



as it is slightly higher than the manufacturer's data; therefore, the measured noise level will be used for worst-case analysis and noise planning purposes. The octave-band noise data for the HVAC unit noise measurement used in the new Nextel planning analysis is provided in Table 1.

Octave Band Center Frequency (Hz)	63	125	250	500	1K	2K	4K	8K	Leq
Noise Level at 5 feet (dB)	79.9	77.5	75.5	70.5	70.6	66.8	59.6	55.2	74.9 dBA

The Nextel wireless facility also incorporates fully enclosed equipment cabinets housed within a pre-fabricated shelter. Noise impacts from these equipment cabinets are not considered significant, and therefore are not included in the noise impact analysis.

## 4.0 METHODOLOGY AND EQUIPMENT

### 4.1 Methodology

#### 4.1.1 Cadna Noise Modeling Software

Modeling of the outdoor noise environment is accomplished using Cadna Ver. 3.5, which is a model-based computer program, developed by DataKustik for predicting noise impacts in a wide variety of conditions. Cadna (Computer Aided Noise Abatement) assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project information such as noise source data, barriers, structures, and topography to create a detailed CAD model and uses the most up-to-date calculation standards to predict outdoor noise impacts.

#### 4.1.2 Summary of Site Specific Features Included in Cadna Model

Features at the project site that were included in the Cadna noise prediction model are listed in Table 2. These are considered to be the only on-site features that will affect the noise propagation of the proposed noise sources to the adjacent property lines.

Description	Height
Topographic Contours	960 to 1390 feet in elevation (AMSL)
Existing Home	25 feet above grade
Existing Water Tank	13 feet above grade
Proposed Nextel HVAC Equipment	4 feet above grade
Proposed Nextel Equipment Shelter	13 feet above grade



#### 4.1.3 Calculated Noise Levels for Model Comparison

In order to validate the results of the Cadna noise prediction model, the noise impacts from the proposed Nextel HVAC equipment were manually calculated as simple attenuation by distance. This was done for each of the property line receiver locations. These values were compared to those predicted by Cadna. The Cadna model includes additional attenuation due to intervening structures, topography, and ground absorption, which the differences in modeled and calculated noise levels are attributed to. This data is summarized in Table 3.

Noise Source	Receiver	Location	Distance from Source (ft.)	Calculated Noise Level (dBA)	Cadna Mode Noise Level (dBA)	Difference (dB)
Marvair ComPac II 74.9 dBA Measured @ 5 ft.	R1	Northern Property Line	112	47.9	45.8	2.1
	R2	Eastern Property Line	166	44.5	28.1	16.4
	R3	Western Property Line	73	51.6	49.0	2.6
	R4	Residential Facade	160	44.8	28.7	16.1

<sup>1</sup> Calculated as attenuation by distance only,  $I_2 = I_1 - 20 \log \left( \frac{d_2}{d_1} \right)$

<sup>2</sup> As predicted by Cadna model

The attenuation difference between the manually calculated and Cadna values at the eastern property line is primarily due to the elevation difference between the lease area and the eastern property line. The eastern property line is lower in elevation by 12 feet and greater. This topography blocks the line-of-sight from the lease area to the eastern property line, resulting in additional sound attenuation.

The attenuation difference at the residential building façade is primarily due to the barrier effect of the equipment shelter itself.

## 4.2 Measurement Equipment

Some or all of the following equipment was used at the site to measure existing noise levels:

- Larson Davis Model 824, Type 1 Sound Level Meter, Serial #824A0343
- Larson Davis Model CA250, Type 1 Calibrator, Serial #2625

The sound level meter was field-calibrated immediately prior to the noise measurement and checked afterwards, to ensure accuracy. All sound level measurements conducted and presented in this report, in accordance with the regulations, were made with sound level meters that conform to the American National Standards Institute specifications for sound level meters (ANSI S1.4-1983, R2001). All instruments are maintained with National Bureau of Standards traceable calibration, per the manufacturers' standards.

## 5.0 IMPACTS

The proposed Nextel facility HVAC equipment noise levels are expected to exceed the County of San Diego nighttime property line noise limits at the western and northern property lines. Based on the project information available, calculations show that HVAC equipment noise impacts from the proposed Nextel facility will be as high as 49.0 dBA  $L_{EQ}$  at the western property line, at the worst case location. The calculated noise levels at each property line at the worst case location are summarized in Table 4.

For details of the acoustical analysis, please refer to Appendix D: Cadna Analysis Data and Results. Please also refer to Figure 6: Site Plan Showing Unmitigated Noise Impacts to Project Vicinity and Property Line Receiver Locations.

Table 4. Calculated Wireless Facility Noise Impact Levels	
Receiver Location	HVAC Equipment Noise Level (dBA $L_{EQ}$ )
R1, Northern Property Line	45.8
R2, Eastern Property Line	28.1
R3, Western Property Line	49.0
R4, Residential Façade	28.7

The HVAC equipment for the proposed Nextel facility will not create any significant noise impacts to the existing residence on the subject parcel. The noise levels at the building façade of the existing home are not expected to exceed 29.0 dBA  $L_{EQ}$ . The property lines that lie south of the existing home will not be impacted by any significant noise generated by the proposed wireless facility.

## 6.0 MITIGATION

Mitigation is required to reduce the property line noise impacts to meet the most restrictive 45 dBA nighttime noise limit at the western and northern property lines.

The required noise levels can be achieved by shielding the air conditioning units with a sound attenuation barrier. The barrier should be constructed to a height of 6-feet relative to the equipment shelter pad grade elevation. The barrier should extend from the northwest corner of the proposed equipment shelter heading northwest a distance of five feet, with a return heading northeast a distance of 11.5 feet. No other noise attenuation mitigation for the proposed project is required.

The sound attenuation barrier should be a single, solid sound wall. The sound attenuation barrier height should be based on the finished pad grade elevation of the proposed prefabricated shelter. The sound attenuation barrier should be solid and constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, with no cracks or gaps through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least one-inch thick or have a surface density of at least 3½ pounds per square foot. Where architectural or aesthetic factors allow, glass or clear plastic may be used on the upper portion, if it is desirable to preserve a

view. Sheet metal of 18-gauge (minimum) may be used, if it meets the other criteria and is properly supported and stiffened so that it does not rattle or create noise itself from vibration or wind. Any doors or gates must be designed with overlapping closures on the bottom and sides and meet the minimum specifications of the wall materials described above. The gate(s) may be of ¾-inch or thicker wood, solid-sheet metal of at least 18-gauge metal, or an exterior-grade solid-core steel door with prefabricated door jambs.

The sound attenuation barrier should be structurally attached to the equipment shelter with no cracks or gaps where the barrier meets the shelter. Otherwise, any seams or cracks must be filled or caulked in order not to compromise the effectiveness of the barrier.

The calculated noise levels, with the sound attenuation barrier mitigation in place, are shown in Table 5. For details of the acoustical analysis, please refer to Appendix D: Cadna Analysis Data and Results.

Table 5: Calculated Mitigated Wireless Facility Noise Impact Levels	
Receiver Location	HVAC Equipment Noise Level (dBA L <sub>EQ</sub> )
R1, Northern Property Line	37.5
R2, Eastern Property Line	28.1
R3, Western Property Line	41.3
R4, Residential Façade	27.6

With the recommended mitigation, the unmanned operation of this facility will be in compliance with the County of San Diego nighttime property line noise limits.

Please refer to Figure 7: Site Plan Showing Mitigated Noise Impacts to Project Vicinity and Property Line Receiver Locations and Figure 8: Sound Attenuation Barrier Detail.

## 7.0 CONCLUSION

With the installation of the recommended sound attenuation barrier, the proposed Nextel wireless facility will be in compliance with all applicable County of San Diego property line noise limits.

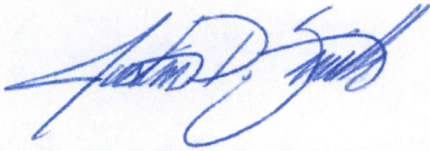
These conclusions and recommendations are based on the most up-to-date, project-related information available. However, noise characteristics of mechanical equipment may vary for specific installations. Verification of compliance with County of San Diego noise regulations can be provided, if desired, by conducting a noise survey consisting of sound level measurements at or close to the nearest impacted locations in each direction, after the project is built and in operation.

This is best accomplished in the late night or very early morning hours while the equipment is in full operation and other ambient noise sources are minimized. If any additional sound attenuation is found to be necessary, it can be specified at that time. We do not expect that any additional sound attenuation will be necessary within the scope of this project.

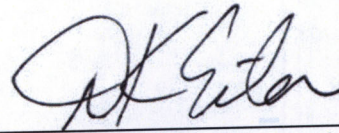
## 8.0 CERTIFICATION

This report is based on the related project information received and measured noise levels, and represents a true and factual analysis of the acoustical impact issues associated with the proposed Nextel wireless telecommunications facility, located 1853 Honey Springs Road, in Jamul, County of San Diego, California. This report was prepared by Justin Smith, Michael Burrill, Charles Terry, and Douglas Eilar.

### EILAR ASSOCIATES



Justin D. Smith, Senior Acoustical Consultant



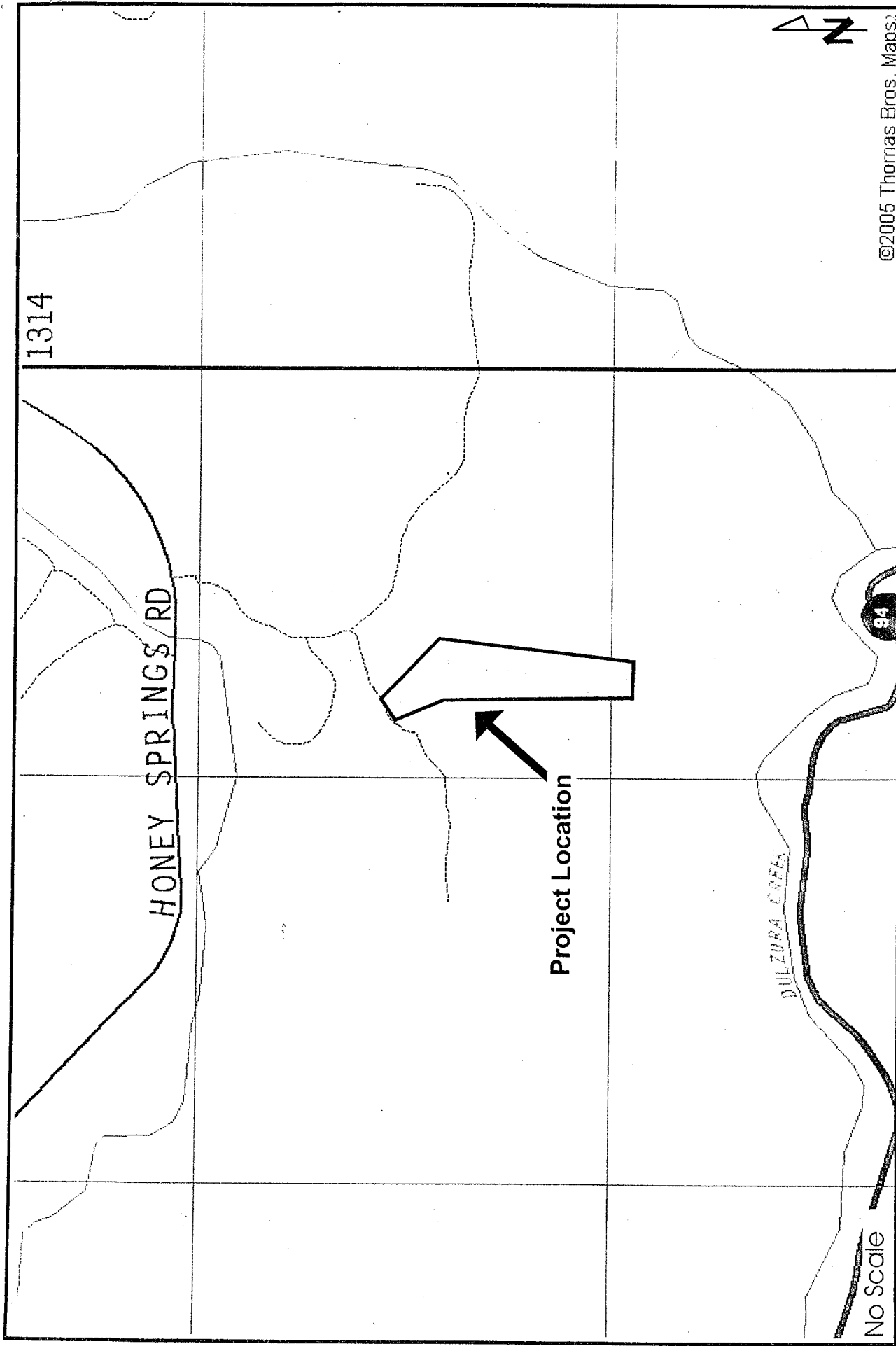
Douglas K. Eilar, Principal

## 9.0 REFERENCES

1. Beranek, Leo L., *Acoustical Measurements*, Published for the Acoustical Society of America by the American Institute of Physics, Revised Edition, 1988.
2. San Diego County Code
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5. Hirschorn, Martin, *Noise Control Reference Handbook*, Revised Edition, 1989.
6. Irvine, Leland K. and Richards, Roy L., *Acoustics and Noise Control Handbook for Architects and Builders*, Original Edition, 1998.
7. Knudsen, Vern O. and Harris, Cyril M., *Acoustical Designing In Architecture*, American Institute of Physics for the Acoustical Society of America, 2<sup>nd</sup> Edition, 1978.
8. Raichel, Daniel R., *The Science and Applications of Acoustics*, American Institute of Physics Press for the Acoustical Society of America, 1<sup>st</sup> Edition, 2000.



## FIGURES



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Thomas Guide Map  
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Figure 1



**LEGEND**

**Reference Layers**

-  Parcels
-  Roads

**APN: 600-220-18-00**

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**6002201800**



**Project Location**

< 290 feet >

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**Assessor's Parcel Map**  
**Job # A60126N1**

**Figure 2**

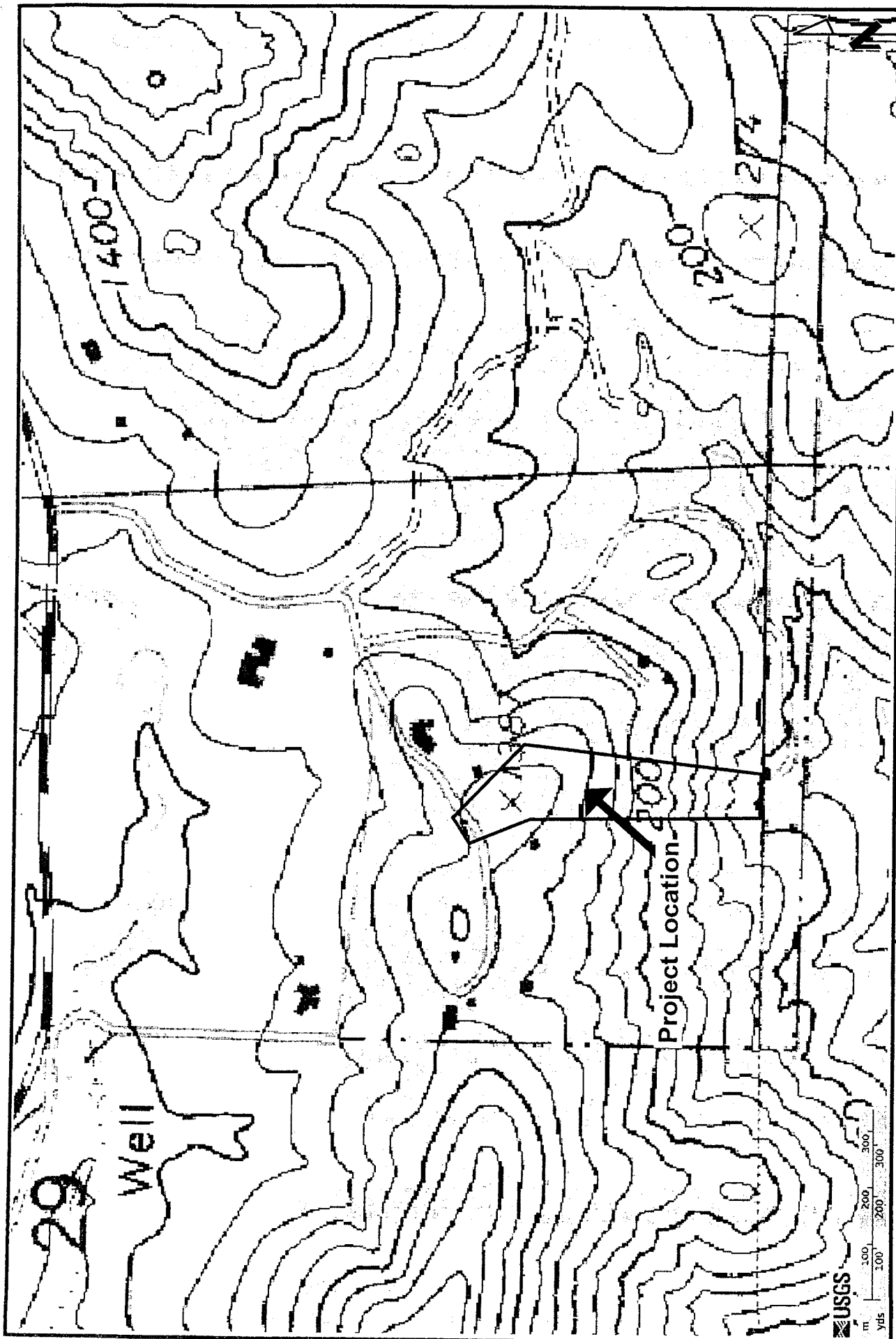


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Satellite Aerial Photograph  
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Figure 3





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Topographic Map  
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Figure 4

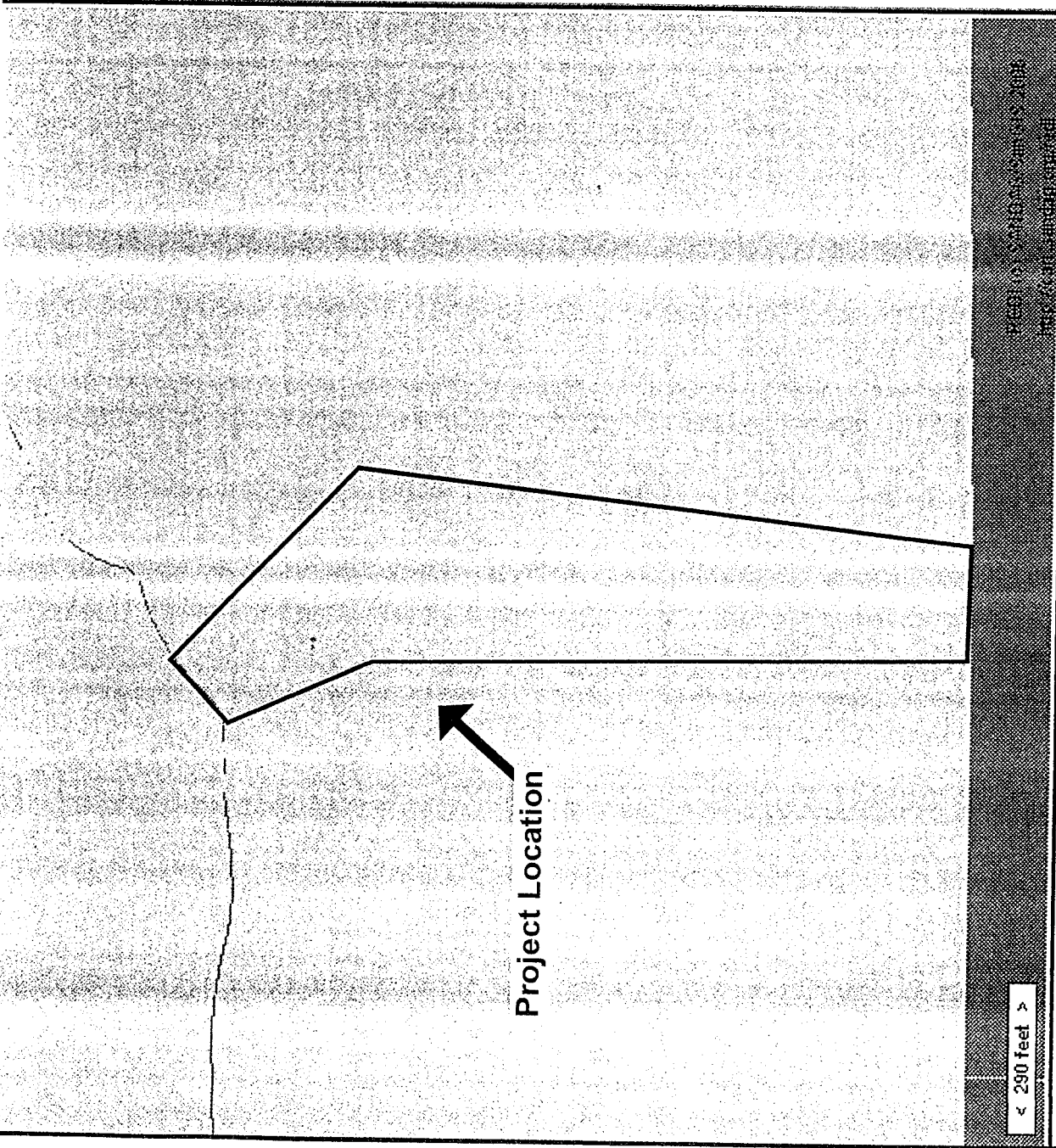
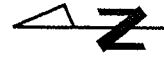
# LEGEND

## Planned Land Use

- Residential
- Commercial
- Industrial
- Public Facilities
- Parks
- Agriculture
- Water
- Reservations

## Reference Layers

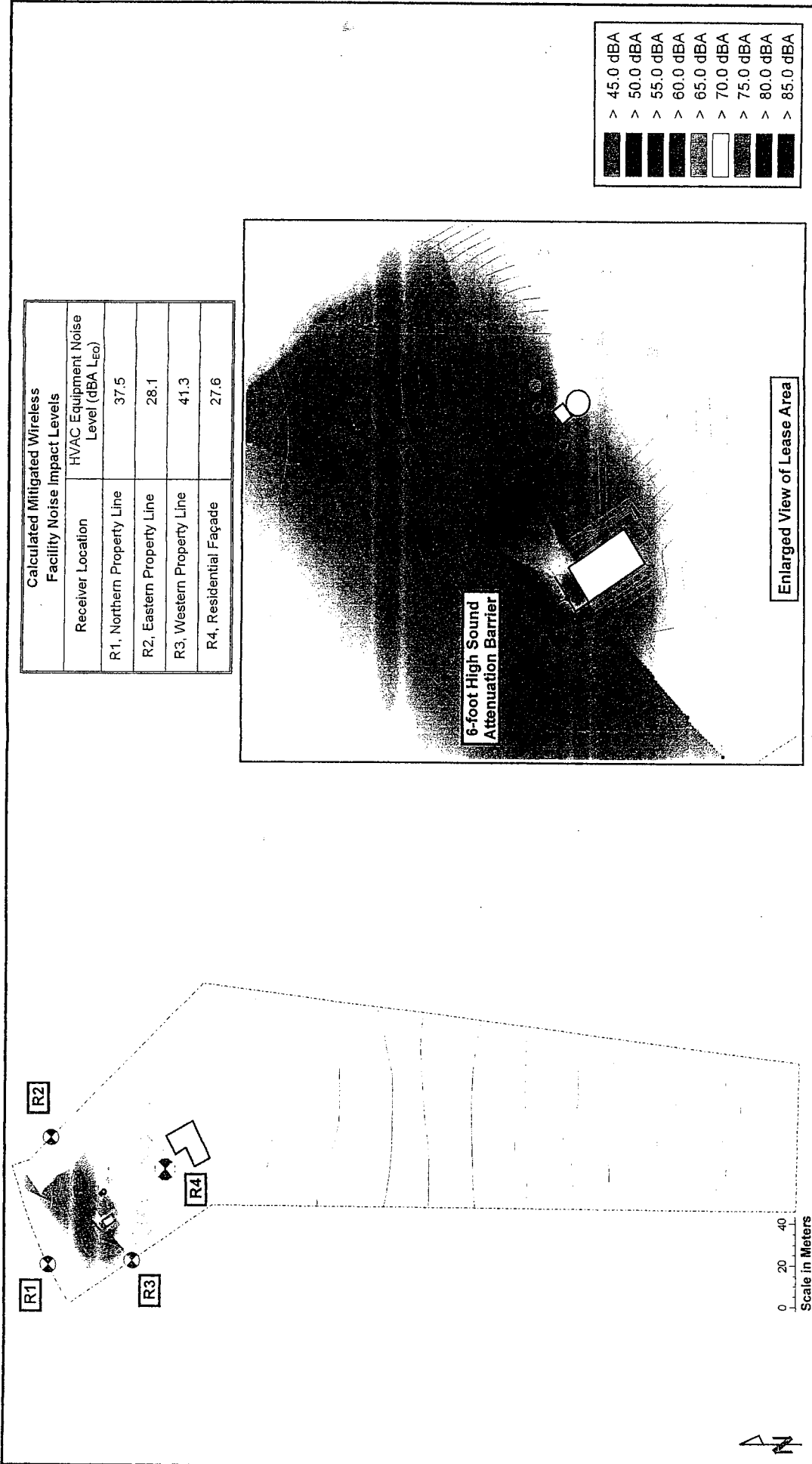
- Parcels
- Roads

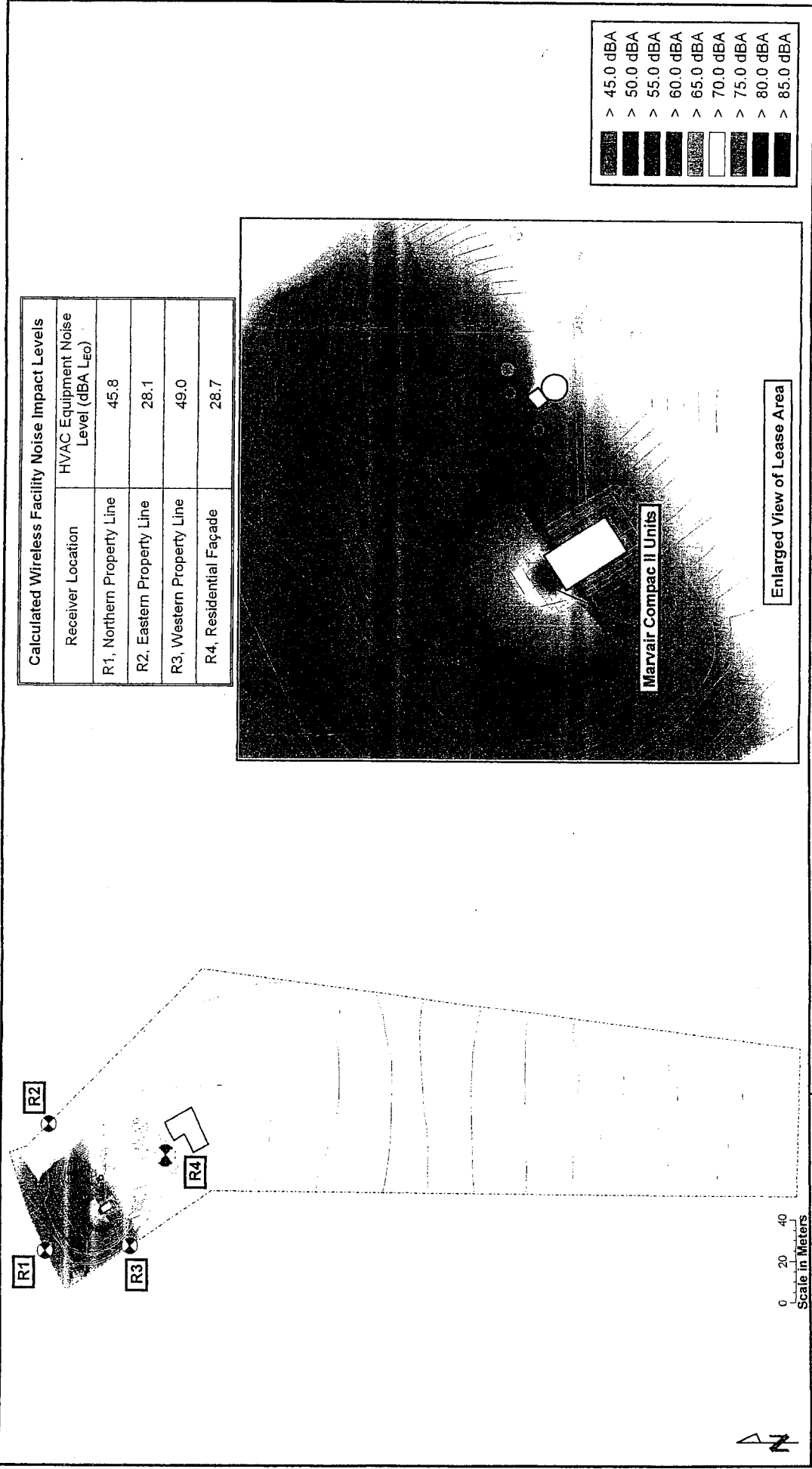


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Planned Land Use Map  
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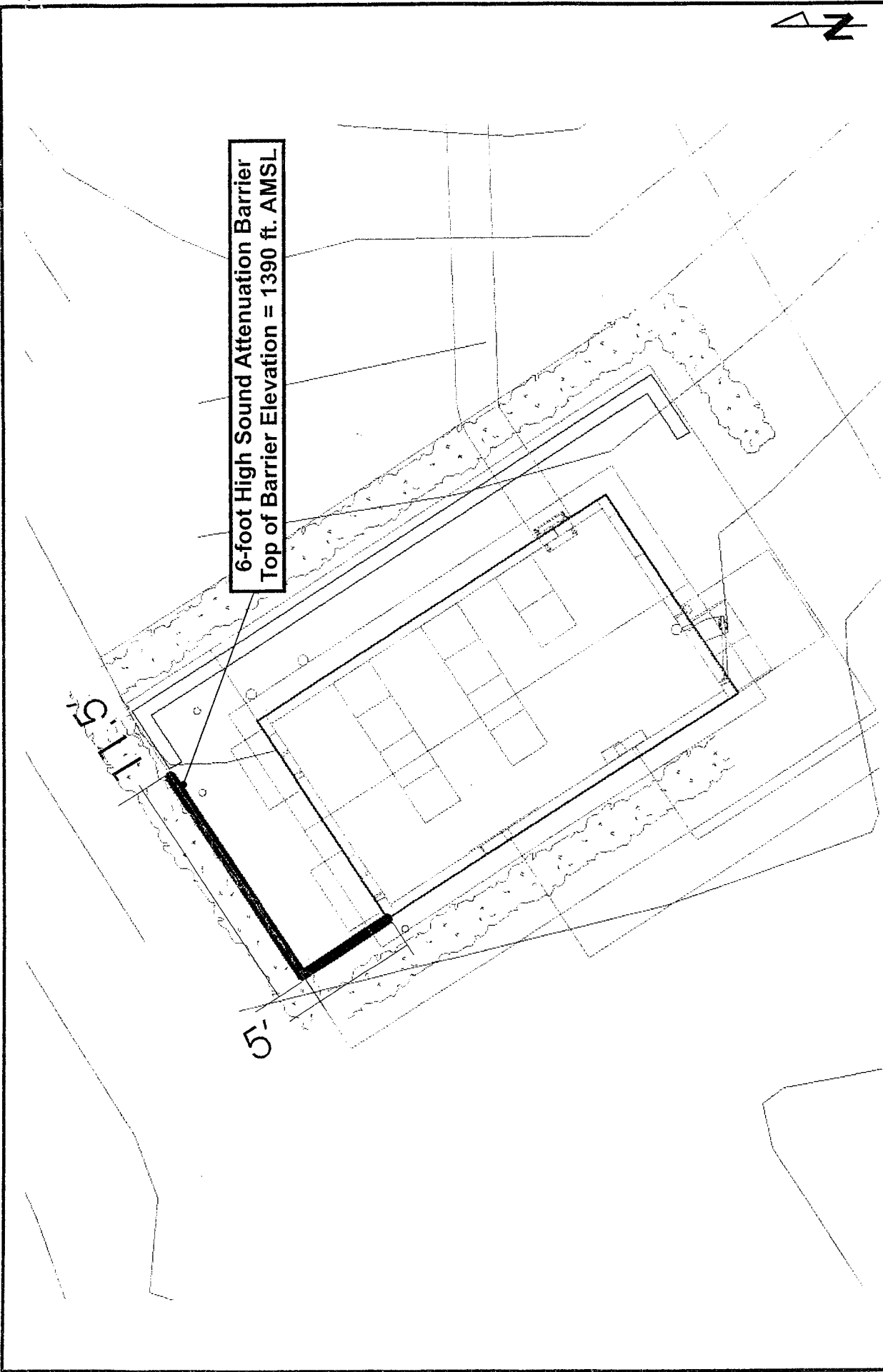
Figure 5





Site Plan Showing Unmitigated Noise Impacts to Project Vicinity and Property Line Receiver Locations  
Job # A60126N2





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Sound Attenuation Barrier Detail  
Job # A60126N2

Figure 8